

WHAT IS CLAIMED IS:

1. A method of reusing an exhaust gas in a polymer production plant in order to reuse an inert gas discharged from a polymer production plant, which comprises a step of adsorbing and removing a polymerization solvent and polymerization monomers contained in an inert gas by passing, through an adsorbent layer, an inert gas discharged from the polymer production plant, wherein an inert gas reaching a predetermined purity by removing the polymerization solvent and polymerization monomers in the step of adsorption and removal is reused in the polymer production plant.

2. The method of reusing an exhaust gas in a polymer production plant according to claim 1, wherein the polymer in the polymer production plant is an olefinic polymer.

3. The method of reusing an exhaust gas in a polymer production plant according to claim 1 or 2, wherein the adsorbent layer is composed of a single layer of at least one kind of adsorbent selected from silica gel and synthetic zeolite, is formed from plural layers each consisting of a single layer of the same or different kind of adsorbent described above, or is formed from the single or plural layers combined with an adsorbent layer consisting of an adsorbent other than silica gel and synthetic zeolite.

4. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 3, wherein the adsorbent layer is formed from:

- (1) a single layer of silica gel or synthetic zeolite,
- (2) plural layers having the single layer of silica gel combined with a single layer of zeolite, or
- (3) plural layers each consisting of the single layer of silica gel.

5. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 4, wherein the adsorbent layer comprises at least two adsorbent layers different in pore diameter laminated in the order of large to small pore diameters in the direction of flow of an exhaust gas.

6. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 5, wherein in the step of adsorption and removal, water is also removed.

7. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 6, which comprises a step of desorbing and removing, from the adsorbent, a polymerization solvent and polymerization monomers adsorbed onto the adsorbent in the adsorbent layer by depressurization.

8. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 7, which comprises

a step of desorbing and removing, from the adsorbent, a polymerization solvent and polymerization monomers adsorbed onto the adsorbent in the adsorbent layer by depressurization while introducing a purge gas.

9. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 7 to 8, wherein the purge gas is an inert gas reaching a predetermined purity by removing the polymerization solvent and polymerization monomers in the step of adsorption and removal.

10. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 9, wherein the inert gas reaching a predetermined purity by removing, with the adsorbent layer, the polymerization solvent and polymerization monomers contained in the inert gas is refluxed to the polymer production plant in order to use the inert gas in the polymer production plant.

11. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 10, wherein the adsorbent layer is pressurized with an inert gas holder drum from a depressurized state in the desorption step to an operational pressurized state in the adsorption step.

12. The method of reusing an exhaust gas in a polymer production plant according to any one of claims 1 to 11, wherein at least

one kind of adsorbent used in the adsorbent layer is formed from an adsorbent not pre-coated with hydrocarbons.